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ABSTRACT

This study evaluated whether slight decrements in hearing sensitivity are associated with other communicative deficits. Data from the 38,497 students included in the National Speech and Hearing Survey (NSHS) were used to partition students into three categories of hearing sensitivity, and the prevalence of other communicative problems was computed for each hearing category. Results showed that among children with only slightly decreased hearing, problems with articulation and voice deviance were evident. No relationship was found between minimal hearing impairment and stuttering. (JDD)

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COEXISTENCE OF COMMUNICATION DISORDERS: SPEECH CHARACTERISTICS OF CHILDREN WITH SLIGHT HEARING IMPAIRMENT

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Abstract

Data collected in the National Speech and Hearing Survey provide a wealth of information on the articulation, voice, and overall intelligibility of school children with a wide range of hearing abilities. This paper presents an overview of unpublished results from this comprehensive and carefully controlled survey, with special emphasis on children with minimal hearing impairment.

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While the literature on deaf speech is extensive, little has been published on the speech characteristics of children with milder degrees of hearing impairment. In recent years, speech and hearing professionals have become increasingly aware that even slight decrements in hearing sensitivity are often associated with other communicative deficits. Data collected in the National Speech and Hearing Survey (NSHS; Hull et. al., 1976) provide a wealth of information on the speech of school children with a wide range of hearing abilities. I'll be presenting an overview of these unpublished results, with special emphasis on children with minimal hearing impairment.

Survey Procedures

Details of the National Speech and Hearing Survey protocols are reported elsewhere (Hull et. al., 1971). Briefly, teams of trained evaluators tested the speech and hearing of children in grades 1 through 12 at 100 school-district sampling points. All geographical regions of the 48 contiguous United States were represented in the sample. Reliable speech and hearing test results were obtained from 38,497 students in all.

The speech of each child was evaluated using the Goldman-Fristoe Test of Articulation, and by analyzing connected-speech samples elicited by stimulus pictures, questions, and verbally stimulated sentence repetitions. Evaluators rated the degree of articulation deviance. Each

child's voice output was also rated according to the degree of deviation from an acceptably clear laryngeal tone and appropriate pitch level.

Audiometric testing was conducted in IAC (model 401) sound booths housed in custom-made mobile units. Twice each day, audiometers were calibrated to ISO, 1964 standards. Pure-tone air conduction thresholds were obtained at 500, 1000, 2000, 3000, and 4000 Hz, using standard "down 10 --up 5" manual techniques. Whenever the initial unmasked thresholds in a child's two ears differed by 40 dB or more at any frequency, 85 dB SPL of white noise was used to mask the better ear and thresholds in the poorer ear were reestablished at all frequencies.

Results

The NSHS sample was partitioned into three categories of hearing sensitivity. Each subject was assigned to a hearing level category according to their best binaural average (BBA), computed by pooling the data for both ears and averaging the best thresholds at 500, 1000, and 2000 Hz. BBA's in the range from 0-15 dB HL were designated as good hearing. 16-25 dB HL was defined as the region of slight hearing impairment. Significant hearing impairment was indicated by BBA's greater than 25 dB HL.

In this presentation, the prevalence of other communicative problems was computed for each hearing category. The significance of differences among categories

was tested using Chi square.

Articulation [Slide 1]

The first slide shows the percentage of children in the entire NSHS sample (ALL) and in each hearing level category who were rated as having mild-to-moderate or severe articulation deviance. It reveals that both the prevalence and severity of deviant articulation increased as hearing level got poorer. It's important to note that even among children with only slightly decreased hearing, articulation problems were far more common than in the NSHS sample as a whole. According to the Chi square analysis, these differences are significant at the 0.01 level of confidence.

Voice [Slide 2]

The percentage of children who's voice deviance was rated as mild-to-moderate or severe is presented in the next slide. Two thirds of children with slight or significant hearing impairment had some degree of voice deviance, compared with 50% prevalence in the NSHS sample as a whole. Interestingly, the prevalence of voice deviance among children with slight hearing impairment was virtually the same as in the significant hearing loss group. However, the proportion of children with extreme voice deviance increased progressively as hearing sensitivity declined. Again, these differences are significant at the Q.01 level of confidence.

Stuttering [Slide 3]

The next slide shows the prevalence of stutters in each hearing category and for the NSHS sample as a whole. For children with good hearing or slightly decreased thresholds, stuttering was no more or less common than it was for the entire NSHS sample, of whom 0.82% were stutterers. In contrast, the stuttering prevalence rate was substantially higher in the significant hearing loss category. However, these prevalence rates are based on a very small number of cases. Of 38,497 subjects in the NSHS, 315 were identified as stutterers, and only four stutterers had significant hearing impairment. Because of these small numbers, the Chi square analysis indicates that the prevalence of stuttering is not significantly different among hearing categories.

Overall Adequacy [Slide 4]

NSHS examiners also made summary judgements of the overall quality of each child's speech. The percentage of children with mild, moderate and severe speech impairments is enumerated in the last slide. Only 17% of children with slight or significant hearing impairment had speech judged to be adequately intelligible, compared with 35% in the NSHS sample as a whole. The proportion of children with moderate or severe speech problems increased progressively with degree of hearing loss. Differences among categories are significant at the 0.01 level of confidence.

Conclusion

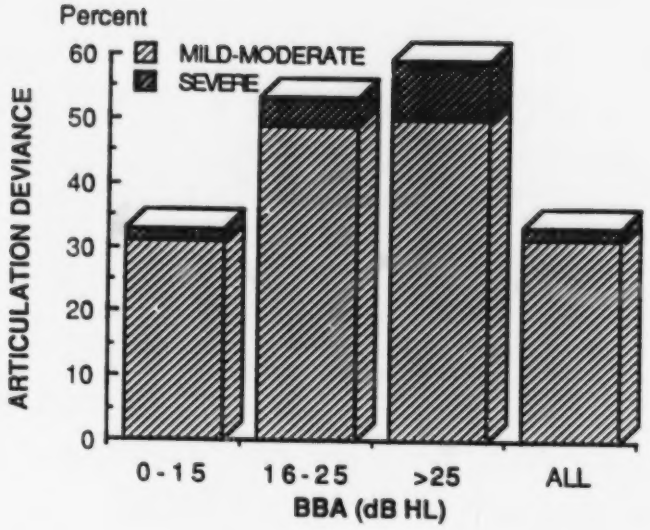
When reviewing these data, it is not surprising to find that children with significant hearing impairment are more likely to demonstrate speech articulation disorders. The fact that children with hearing thresholds in the 15 to 25 dB HL range also show a relatively high prevalence of articulation problems is noteworthy. Also, clinicians do not ordinarily associate voice disorders with slight or mild hearing impairment. Yet the NSHS results suggest that such a relationship does indeed exist.

In recent years, many researchers have investigated the possible relationship between delayed language development and slight hearing impairment associated with chronic otitis media. The NSHS results indicate that aspects of speech production may also be affected by mildly depressed hearing sensitivity.

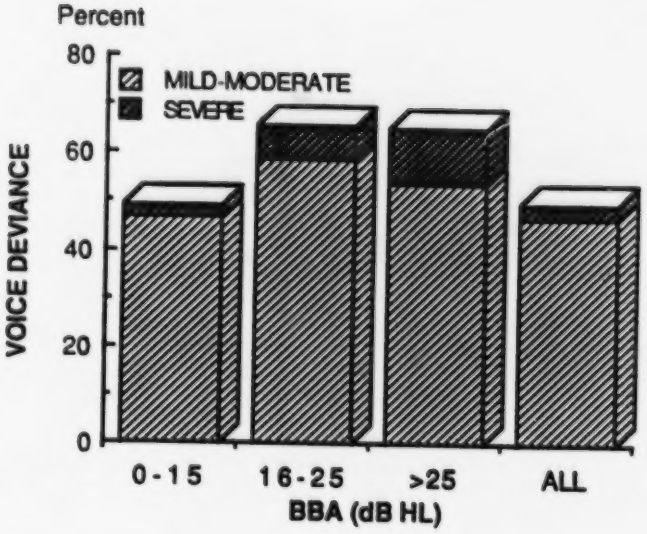
References

Hull, F.M., Mielke, P.W., Timmons, R.J., & Willeford, J.A. (1971). The National Speech and Hearing Survey: Preliminary results. Asha, 13, 501-509.

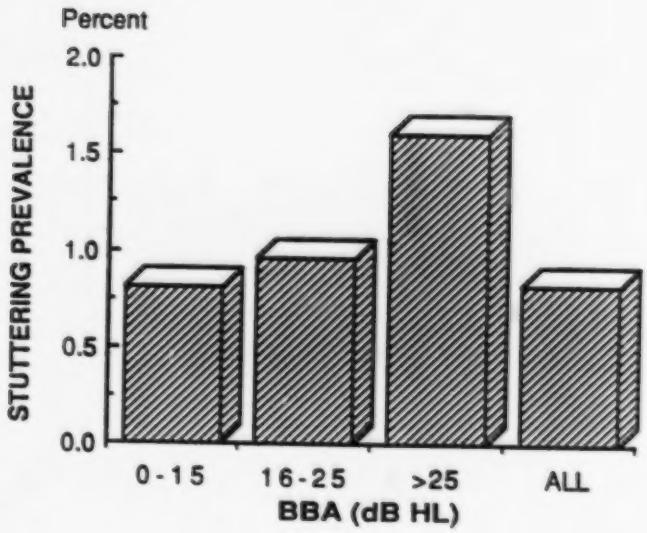
Hull, F.M., Mielke, P.W., Willeford, J.A., & Timmons, R.J. (1976). National Speech and Hearing Survey, Final Report. Project No. 50978, Grant No. OE-32-15-0050-5010(607), Office of Education, DHEW, Washington, D.C.



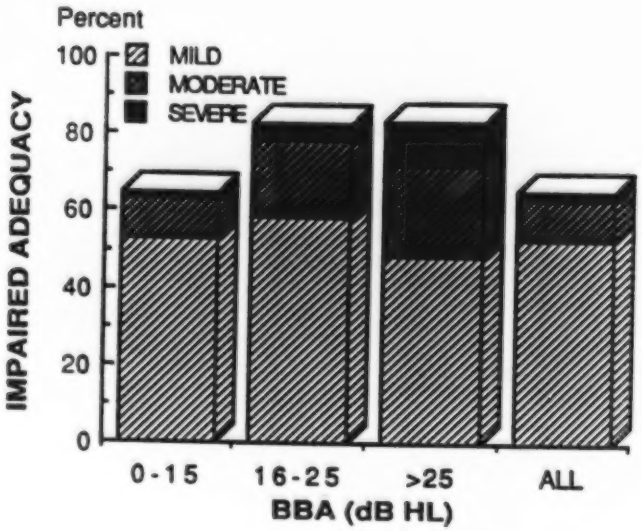
SLIDE 1



SLIDE 2


Percent
2.0
1.5
1.0
0.5
0.0
STUTTERING PREVALENCE
0-15
16-25
>25
ALL
BBA (dB HL)

SLIDE 3


Percent
100
80
60
40
20
0
MILD
MODERATE
SEVERE
IMPAIRED ADEQUACY
0-15
16-25
>25
ALL
BBA (dB HL)

SLIDE 4